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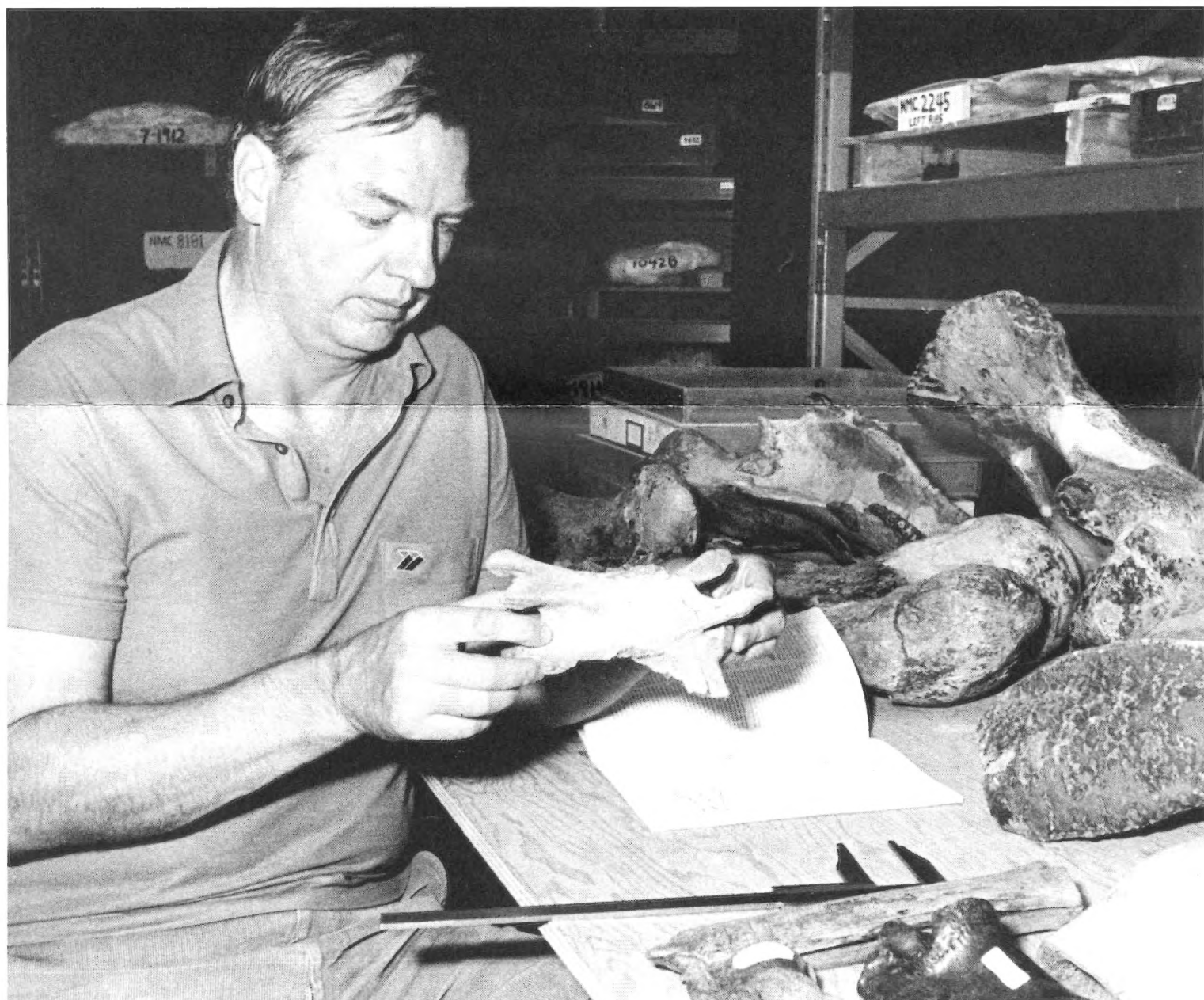
The NMNS Climatic Change Project

Are we on an icy slide toward another glaciation, or will Canada become rapidly warmer?

This country is highly vulnerable to climatic change because of such factors as its northern position and the massive mountain barrier on its western margin that lies athwart easterly-moving storm tracks. A slight average annual warming over the next few decades (as forecast by some experts because of increasing amounts of carbon dioxide being injected into the upper atmosphere — the "greenhouse effect") could have a great impact on our way of life and economy. Similarly, a slight average annual cooling over the next few decades could drastically reduce grain production, and if it is prolonged, could lead to the onset of glaciation. Indeed, during the last glaciation, ice covered more than 90% of Canada.

Two cases clearly show Canada's vulnerability to climatic change and its effect on human populations. People of the Thule culture arose near the Bering Strait and rapidly spread across northern Canada to Greenland about 1000 years ago. They had developed techniques for hunting large marine mammals including gigantic bowhead whales (a staple food) and used whale bones as frames for their sod houses. Increasing cold of the "Little Ice Age" (about 1570 to 1820 A.D.) resulted in expansion of sea ice and consequent scarcity of bowhead whales in the central Canadian Arctic. Thule people were forced to abandon their settlements in the region, leaving their descendants, the late Prehistoric Inuit scattered in several small groups on the fringe of their former range. They lived in snow houses in winter and shifted the focus of their hunting from bowheads to ringed seals and caribou. Their once beautifully decorated implements became plain and utilitarian.

Perhaps the most devastating climatic event in Canada's recent history was the Prairie drought of the 1930's. Its effects were aggravated by a worldwide economic depression. Between 1931 and 1937 more than 120,000 people left the Prairie Provinces. Since conditions as dry as the



Dr. C.R. Harington, Chief of the Paleobiology Division and editor of the "Climatic Change in Canada" series, has conducted extensive research on life in the Yukon during the Ice Age.

worst year of the 1930's may be expected once every 20 years, we can now think of planning ahead to minimize the impact.

Because of Canada's vulnerability to climatic change, and a lack of an integrated multidisciplinary program for studying our past climate, the NMNS Climatic Change Project was organized. Since its beginning in 1977, a basic aim of the Project has been publication of significant data on climatic change in Canada since

the peak of the last glaciation (about 20,000 years ago). Such information must be gathered painstakingly, checked and pieced together from many different sources including early instrumental weather records, historic documents (the Hudson's Bay Company post journals and ship's logs have turned out to be a goldmine of information), tree rings, archaeological remains, plant and animal fossils, as well as glaciological studies. Several volumes of the "Climatic Change in Canada" series have contained such information. Of course, ability to predict future climate is an important goal in this type of research, but regardless of that, the results should be of great interest and value academically

(for example, to biogeographers, paleoecologists, archaeologists and historians).

Compilation of a comprehensive, annotated bibliography on the subject was another goal of the Project: that volume was published in 1984 as *Climatic Change in Canada 4*. I hope it will serve as a "refresher" on sources as well as a useful research tool for professionals, and an introduction to references for laymen and students interested in the topic and for scientists beginning to work in the field.

Another goal is promotion within this country of expertise in the study of climatic change, and the Project has approached this by providing contract funds for the support of many pro-

fessionals and graduate students at universities from Halifax to Vancouver. At least six post-graduate theses have resulted from Project funding. *Climatic Change in Canada 5* (the results of an international meeting sponsored by the NMNS Climatic Change Project in May 1983 on "Critical Periods in the Quaternary Climatic History of Northern North America") is now published, and a travelling exhibit on Canada's changing climate (stemming from work of the Project) is scheduled to tour Canada for five years. The exhibit, entitled *Come Rain...Come Shine*, opened in Ottawa in June 1985.

C.R. Harington
Paleobiology Division

Collecting Climates?

How can a museum, which collects things for research and display, collect a "climate"?

It is not possible, of course, but then it is impossible to see the wind, although we can certainly see its effects. Branches broken, leaves on the ground, things turned over; all evidence of something in the past, which we could not have seen even if we had been there.

Changing climate leaves a trail through the past in just the same way. In fact, it is often possible to reconstruct climatic conditions to within a few degrees based on the animal and plant remains found. By collecting animals and plants from a wide series of times past, a complete history of the changing climate can be deduced.

Once we know all that, we can even enter the realm of the "prophet", by predicting the future. We know what trends there were in temperature and rainfall for the past several thousands of years, and can guess what they will be in the future. Because we "saw" what happened to the animals and plants in these conditions, we can "see" into the future and understand what our world will be like.

Fascinating, yes. But also potentially incredibly useful. Imagine the difficulty of attempting to plan for future agriculture or wildlife and fisheries management in Canada if the climate is changing by a degree or so every 50 years, and you did not know it? But now that we can predict both the change and the effect, we can plan for it.

One thing we also know, people can alter the course of climatic change, by increasing the reflectance of the land (building roads, cities and clearing the land), by adding to the amount of carbon dioxide in the air (burning fossil fuels) and even by using excessive amounts of light gases like Freon. These factors have to be added into the prediction of what will happen in the future. Can we also predict our own behaviour?

Alan R. Emery
Director

BIOME

Editor-in-Chief:
Nick Bélanger

Acknowledgements:
Bonnie Livingstone
Louise L. Trahan

Graphic Design:
Acart Graphic Services Inc.

Illustrations:
C.H. Douglas
Paul Geraghty
Marcel Jomphe
Sandra Taylor

*Cette publication
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offerte en français*

Comments and questions
should be directed to:

BIOME
National Museum of
Natural Sciences
Ottawa, Ontario
K1A 0M8

Yesterday's Forecast: Variable

Climate change surrounds us. Each hot, summer day, each spring rain, can leave its imprint on the world. For example, tree rings, and microorganisms such as fossil pollen in lake bottoms may contain a record of past climate. Fragmentary and hard to read, this record covers thousands, even millions, of years.

Early civilizations kept records too, although they lacked reliable weather instruments. Seventeen centuries ago, Ptolemaeus of Alexandria kept a weather diary. However, accounts of storms, crop yields, and river levels can only give hints about the climates of the past three thousand years.

Canada's brief but excellent recorded weather history owes much to Hudson's Bay Company trading post factors, who kept journals of "...the weather & progress of the Season...". Beginning with the 1705 Fort Albany journal, these invaluable archives enabled Cynthia Wilson, of the NMNS Climatic Change Project, to reconstruct daily weather maps for June, 1816. With the coldest summer on record, 1816 is in fact known as the "year without a summer".

Although the fur traders who recorded 1816 weather are dead, there are living representatives from that summer. Some White Spruce trees still growing on the shores of Hudson's Bay laid down annual growth rings, their thickness and density determined by the temperature and precipitation. Tree-ring experts (dendrochronologists and dendroclimatologists) have extracted cores from their trunks, and measured the rings, to provide an index to the yearly variations in temperature. The tree-ring record has been correlated with that in the traders' journals. Many trees in an area must be sampled, and their growth patterns compared by "cross-dating", to build up a composite picture of a region's climate. The Arizona Bristlecone Pine record goes back more than 8000 years.

We can look even farther back with another botanical technique: within most ice-age sediments, fossil pollen grains and spores are abundantly preserved. Scientists compare these microfossils to the pollen of known plants, and can often partially reconstruct the history of the flora. This vegetational history allows us to reconstruct the climate history, since the plants that produced the pollen and spores reflect the sequence of climate changes.

Much of this work is done with peat-bog deposits where pollen is usually abundant, well-preserved, and where wood fragments can be dated by radiocarbon techniques. The changes in the kinds of plants and their relative abundance are compared with radiocarbon dates. Scientists



Extracting cores from White Spruce trees growing on the shores of Hudson's Bay provides an index to past yearly variations in temperature.

can often obtain precise knowledge of past climates from fossil pollen. Some species of plants, such as sedums and mountain avens, are sensitive to mean annual maximum summer temperatures and grow only where a certain temperature is not exceeded. Pollen from these plants in a peat deposit means that this temperature was not exceeded when the deposit was laid down.

Information about past climates comes from lakes in which distinct layers of silt and clay are deposited each year, the thickness depending on the amount of spring run-off and winter snow. These layers, or "varves", can be studied much like tree rings, and can even be compared directly with tree rings from the same area to show annual climatic variation. In Scandinavia a 14,000-year-long series has been pieced together, to reveal climate cycles of 11, 90, and 200 years. In Alberta, fossil varves were found in 300 million-year-old shale, the

series covering a 900-year period in a time well before the dinosaurs. Incredibly, it revealed the same 11, 90, and 200 year climatic swings.

What better place to look for fossil climates than in the world's deep-freezes — Antarctica and the Greenland ice sheet? Here, annual snow layers are compressed into ice, hundreds of meters thick, and thousands of years old. Scientists can "read" the past temperatures of the polar regions by measuring the amount of oxygen-18, a heavier form of oxygen, in each layer. As moist air moves over the oceans towards the poles, the oxygen-18 tends to fall out in snow before the lighter, more common oxygen-16. The colder the winter, the less oxygen-18 reaches the poles. Measuring how much carbon-14 remains in the tiny air bubbles trapped in the ice can tell scientists how long ago each layer of snow fell. Many warm or cold periods, including the last ice age, show up in the data.

To be sure, many corrections must be applied to the data, and results from different studies must be reconciled. The story in the trees, ancient pollen, lake bottoms and ice sheets has become clearer with the aid of radiocarbon-dating techniques, powerful computers, and sophisticated statistical analyses that can make sense out of the massive amounts of data. The evidence of climate change is all around us. We just have to know how to read it.

Doug Hoy
Public Services Division
and
David M. Jarzen
Paleobiology Division



PROGRAMS AND ACTIVITIES

At the National Museum of Natural Sciences

October 1985/January 1986

Come Rain...

Come Shine

There's still time to learn
about Canada's changing climate!

How does today's climate compare with that of the past? Can we say what the climate will be like in the future? To find out, visit *Come Rain... Come Shine*. This exhibition on climatic change will answer a lot of questions, replace folklore with facts and demonstrate that the most consistent feature of Canada's climate is its changeability. *Come Rain... Come Shine* is on view in the Temporary Exhibits Gallery (3rd floor east) until December 1; teachers are invited to book an October or November **class visit**. Programmes are offered for grades 6 to 10. Students will tour the exhibition, determine weather conditions with simple instruments, and make their own forecasts. Space is limited, so call

995-9538 beginning October 7. What lurks below the ice of the world's longest skating rink? In *Canal Knowledge*, we'll be taking a look at the fish and invertebrates that are revealed when the Rideau Canal is drained, sometime in late October. Call 995-9538 to join us; registration also begins on October 7 and is limited to 35 participants. The last time we looked, there were a few surprises! Our other Fall and Winter activities include *Life on Earth: Fact/Fiction*, sponsored in co-operation with the Ottawa Film Society. Back by popular demand, this Sunday series of **feature-length films** shown in the Auditorium (1st floor), such as *20,000 Leagues Under the Sea* and *Born Free*, combines Hollywood's view of the

animal world with a look at real life. Before each film, Museum staff or guest speakers will give a short talk about some of the fascinating animals to appear on the screen that day. Specimens will be on display for you to handle and study, and the specialist will hold a question period after the screening. Because of the popularity of this series, we suggest that you come early to be sure of a seat! Programmes are subject to change without notice.

You might wish to visit some of our other interesting exhibitions before or after our film showings. *Living Nature '85*, a national exhibition of nature-related works by Canadian artists, will take place in the Salon (3rd floor) from October 9 to October 20, and *Lichens: Fine Details of the Natural Landscape*, from October 1 to December 15 in the Plant Life Gallery (4th floor east). This exhibition is made up of surprisingly beautiful photographs that offer an intriguing introduction to these lowly organisms not entirely understood by scientists, and will be embellished by specimens and **demonstrations** of how to dye with lichens by Judith Rygiel of the Ottawa Weavers Association. *Red Bay* illustrates the

work of the Museum's Zooarchaeological Identification Centre at the site of a 16th-century shipwreck and whaling station at Red Bay, Labrador. The exhibition will be on view in the Foyer (1st floor) until December 1, and will be complemented by *The Basque Whalers of Labrador*, a film depicting the story of a daring enterprise and its consequences on nature. Screenings in the Auditorium will be followed by interpretive receptions in the Salon featuring Dr. Steve Cumbaa, NMNS Zooarchaeologist, and a marine archaeologist from Parks Canada, both of whom participated in the Red Bay project.

Music at the Museum will also be presented in the Salon, a series of five Sunday **evening concerts** made possible through the collaborative efforts of the Ottawa-Hull District Federation of Musicians, the Canadian Broadcasting Corporation, Radio-Canada and the Museum. The first concert will be held on November 10; as the planning schedule is not yet finalized, please call 996-3102 after October 15 for further information. A second series of Sunday evening concerts featuring young and talented musicians is also being developed.

Finally, there are our **Christmas activities**, which inaugurate a series of exhibitions and programmes dedicated to birds in 1986. The whole family is invited to attend our *Bird Feeders Workshop* in the Temporary Exhibits Gallery and make Yuletide presents for our feathered friends. Bring a well washed milk carton, plastic detergent or bleach bottle. Children of all ages can also attend *Chanter les oiseaux* in the Auditorium, a musical performance about birds featuring Suzanne Pinel, a well-known local entertainer. And between December 21 and 27, there is the *Rag and Bone Puppet Theatre*, in which children from 4 to 7 years old will make their own bird puppets. Registration is required for this activity, which is limited to 50 children. Call 995-9538 beginning December 9.

Call 996-3102 for information about other activities that we are planning for Christmas. Our doors are open six days a week, from 10 a.m. to 5 p.m. Closed Christmas Day and Mondays, except holidays. Please note that the Museum will open its doors at 7 p.m. to allow access to the concerts. Admission is always free - join us. Season's Greetings!

CALENDAR OF EVENTS

OCTOBER						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
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NOVEMBER						
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DECEMBER						
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JANUARY						
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19	20	21	22	23	24	25
26	27	28	29	30	31	

OCTOBER

continuing exhibit
Come Rain... Come Shine

continuing exhibit
Red Bay

1
opening of exhibit
Lichens: Fine Details of the Natural Landscape

7 to November 22
registration for
Come Rain... Come Shine
class visits in English and French

7 to 15
registration for
Canal Knowledge
bilingual excursion

9
opening of exhibit
Living Nature '85

12
1:30 p.m. to 4:30 p.m.
Dyeing with Lichens
bilingual demonstration

13
1:30 p.m.
Les oiseaux
Life on Earth film in French

20
end of exhibit
Living Nature '85

27
1:30 p.m.
The Birds
Life on Earth film in English

NOVEMBER

3
1:30 p.m.
The Basque Whalers of Labrador
Red Bay film in English

3
3 p.m.
Les pêcheurs basques du Labrador
Red Bay film in French

9
1:30 p.m. to 4:30 p.m.
Dyeing with Lichens
bilingual demonstration

10
1:30 p.m.
Vivre libre
Life on Earth film in French

10
7:30 p.m.
Music at the Museum
concert

23
1:30 p.m. to 4:30 p.m.
Dyeing with Lichens
bilingual demonstration

24
1:30 p.m.
Born Free
Life on Earth film in English

DECEMBER

1
end of exhibit
Come Rain... Come Shine

end of exhibit
Red Bay

9 to 13
registration for
Rag and Bone Puppet Theatre
workshop in English

15
end of exhibit
Lichens: Fine Details of the Natural Landscape

21 & 22
28 & 29
1:30 p.m. to 4:30 p.m.
Bird Feeders
bilingual workshop

21
2 p.m.
Chanter les oiseaux
musical performance in French

JANUARY

4 & 5
11 & 12
18 & 19
25 & 26
1:30 p.m. to 4:30 p.m.
Bird Feeders
bilingual workshop

5
1:30 p.m.
Vingt mille lieus sous les mers
Life on Earth film in French

19
1:30 p.m.
20,000 Leagues Under the Sea
Life on Earth film in English

Corner of Metcalfe and McLeod Streets



National Museums
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PROGRAMMES ET ACTIVITÉS

au Musée national des sciences naturelles

D'octobre 1985 à janvier 1986

«Beau temps... mauvais temps»

Il est encore temps de s'instruire au sujet du climat changeant du Canada!

Comment le climat actuel se compare-t-il à celui du passé? Pouvons-nous prédire ce que sera le climat dans l'avenir?

Pour le savoir, venez visiter «Beau temps... mauvais temps». Cette exposition sur les changements climatiques répondra à beaucoup de questions, substituera les faits aux croyances populaires et montrera que l'aspect le plus constant du climat canadien, c'est sa variabilité. «Beau temps... mauvais temps» sera ouvert aux visiteurs à la Galerie des expositions temporaires (côté est du 3^e étage) jusqu'au 1^{er} décembre; les enseignants sont invités à faire des réservations en vue d'une **visite de classe** en octobre ou en novembre. Il y a des programmes pour les élèves de la 6^e à la 10^e année. Ceux-ci parcourront l'exposition, détermineront les conditions climatiques à l'aide d'instruments simples et feront leurs propres prévisions. L'espace étant restreint, nous vous conseillons de téléphoner au 995-9538 à compter du 7 octobre.

Qu'est-ce qui se cache sous la glace de la plus longue patinoire au monde? L'excursion *Le monde du canal* vous fera connaître la faune des poissons et des invertébrés qui est mise à jour lorsqu'on vide le canal Rideau vers la fin d'octobre. Téléphonnez-nous au 995-9538; l'inscription débute également le 7 octobre et le nombre de participants est limité à 35. La dernière séance d'observation nous a réservé quelques surprises!

Au nombre des autres activités de l'automne et de l'hiver, mentionnons *La Terre et la vie: fiction et réalité*, parrainée en collaboration avec le Ciné-club d'Ottawa. De nouveau à l'affiche, en réponse à la demande populaire, cette série dominicale de **longs métrages** tels que *Vingt mille lieues sous les mers* et *Vivre libre*, nous offre une vue hollywoodienne du monde animal conjugée à une observation de la vie réelle. Avant la projection de chaque film à l'auditorium (rez-de-chaussée), des interprètes ou scientifiques invités donneront une brève allocution sur certains des ani-

maux fascinants qui animeront l'écran ce jour-là. Des spécimens seront exposés, que vous pourrez manipuler et étudier, et le spécialiste répondra à vos questions après la projection du film. Étant donné la popularité de cette série, nous vous conseillons de venir de bonne heure pour être sûr d'avoir un siège! Les programmes pourront être modifiés sans préavis.

Vous aurez le loisir de visiter certaines de nos autres expositions intéressantes avant ou après la projection des films. «Nature vivante 1985», une exposition nationale d'œuvres d'artistes canadiens se rapportant à la nature, sera présentée au Salon (3^e étage) du 9 au 20 octobre et «Les lichens: broderies de la nature», à la Galerie «La vie végétale» (côté est du 4^e étage) du 1^{er} octobre au 15 décembre. Cette exposition se compose de superbes photographies qui constituent une introduction fascinante à ces organismes inférieurs trop peu connus encore des scientifiques, et on pourra y voir aussi des **démonstrations** sur les méthodes de teinture aux lichens par Judith Rygiel de l'Association des tisserands d'Ottawa. On pourra également assister à l'exposition «Red Bay», faisant connaître les travaux du Centre d'identification zooarchéologique du Musée sur l'emplacement d'une épave du XVI^e siècle et d'un poste de chasse à la

baleine à Red Bay (Labrador). Cette exposition est en montre au rez-de-chaussée jusqu'au 1^{er} décembre et sera complétée par le film *Les pêcheurs basques du Labrador*, qui relate l'histoire d'une entreprise audacieuse et de ses répercussions sur la nature. Une réception au Salon suivra les projections du film à l'auditorium. M. Steve Cumbaa, zooarchéologue du MNSN ainsi qu'un archéologue marin de Parcs Canada ayant aussi participé au projet Red Bay, seront les invités spéciaux.

La musique au Musée est une série de cinq **concerts** dominicaux de soirée dont la présentation au Salon est rendue possible grâce aux efforts conjoints de la Fédération des musiciens du District de l'Ottawa, de la Canadian Broadcasting Corporation, de Radio-Canada et du Musée national des sciences naturelles. Le premier concert aura lieu le 10 novembre. Comme la programmation n'a pas encore été mise au point, téléphonez au 996-3102 après le 15 octobre pour en savoir davantage à ce sujet. On s'emploie également à préparer une deuxième série de concerts dominicaux mettant en vedette de jeunes musiciens talentueux.

Mentionnons pour finir nos **activités de Noël**, qui débiteront une année où des programmes et des expositions seront dédiés aux oiseaux.

Toute la famille est invitée à la Galerie des expositions temporaires afin d'assister à notre atelier *Les mangeoires d'oiseaux* et à préparer des cadeaux de Noël pour nos amis ailés. Apportez un contenant de lait en carton ou une bouteille de plastique (à déterger ou à eau de javel) après l'avoir bien lavé. Petits et grands sont aussi invités à *Chanter les oiseaux* à l'auditorium lors du spectacle que donnera Suzanne Pinel, artiste bien connue de la région. Entre le 21 et le 27 décembre, les enfants de 4 à 7 ans pourront assister au spectacle du *Rag and Bone Puppet Theatre* et ils auront l'occasion de fabriquer leurs propres marionnettes d'oiseaux. Il est nécessaire de s'inscrire pour participer à cette activité qui est réservée à un maximum de 50 enfants. Les personnes intéressées peuvent téléphoner au 995-9538 à compter du 9 décembre.

Nous prévoyons offrir d'autres activités de Noël; pour obtenir de plus amples renseignements, téléphonez au 996-3102. Nos portes sont ouvertes six jours par semaine, de 10 h à 17 h. Elles seront fermées le jour de Noël et les lundis, sauf les jours fériés. Veuillez noter que le Musée ouvrira ses portes à 19 h afin de permettre l'accès aux concerts. L'admission est toujours gratuite; soyez des nôtres. Joyeuses fêtes!

CALENDRIER • DES • ÉVÉNEMENTS

OCTOBRE

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NOVEMBRE

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DÉCEMBRE

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JANVIER

D	L	M	M	J	V	S
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OCTOBRE

exposition en cours
«Beau temps... mauvais temps»

exposition en cours
«Red Bay»

1
ouverture de l'exposition
«Les lichens: broderies de la nature»

7 au 22 novembre
inscription pour
Beau temps... mauvais temps
visites de classe en français
et en anglais

7 au 15
inscription pour
Le monde du canal
excursion bilingue

9
ouverture de l'exposition
«Nature vivante 1985»

12 13 h 30 à 16 h 30
La teinture aux lichens
démonstration bilingue

13 13 h 30
Les oiseaux
film de la série
La Terre et la vie en français

20
fin de l'exposition
«Nature vivante 1985»

27 13 h 30
The Birds
film de la série
La Terre et la vie en anglais

NOVEMBRE

3 13 h 30
The Basque Whalers of Labrador
film complétant l'exposition
«Red Bay»
en anglais

3 15 h
Les pêcheurs basques du Labrador
film complétant l'exposition
«Red Bay»
en français

9 13 h 30 à 16 h 30
La teinture aux lichens
démonstration bilingue

10 13 h 30
Vivre libre
film de la série
La Terre et la vie en français

10 19 h 30
La musique au Musée
concert

23 13 h 30 à 16 h 30
La teinture aux lichens
démonstration bilingue

24 13 h 30
Born Free
film de la série
La Terre et la vie en anglais

DÉCEMBRE

1
fin de l'exposition
«Beau temps... mauvais temps»

fin de l'exposition
«Red Bay»

9 au 13
inscription pour
Rag and Bone Puppet Theatre
atelier en anglais

15
fin de l'exposition
«Les lichens: broderies de la nature»

21 et 22 13 h 30 à 16 h 30
28 et 29
Les mangeoires d'oiseaux
atelier bilingue

21 14 h
Chanter les oiseaux
spectacle en français

JANVIER

4 et 5 13 h 30 à 16 h 30
11 et 12
18 et 19
25 et 26
Les mangeoires d'oiseaux
atelier bilingue

5 13 h 30
Vingt mille lieues sous les mers
film de la série
La Terre et la vie en français

19 13 h 30
20,000 Leagues Under the Sea
film de la série
La Terre et la vie en anglais

Angle des rues Metcalfe et McLeod



Musées nationaux
du Canada

National Museums
of Canada

Canada

Camels in the Yukon?

Try to imagine a northern Canadian landscape where camels wander amidst the caribou, stopping to graze on grasses and browse on arctic shrubs. Sounds far-fetched? Actually, if you could travel back in time some 20,000 years to the heart of the Yukon, you might be lucky enough to see just such a scene.

Few people realize that camels once lived in northern Canada — or that they and their close relatives, the llamas, actually originated in the western United States over 35 million years ago, spreading much later to Eurasia, Africa and South America. But Museum scientists have discovered dozens of fossilized camel bones in the Yukon, some even north of the Arctic Circle.

Dr. Dick Harington, chief of the Museum's Paleobiology Division, and his colleagues have been travelling to the Yukon since 1966 to collect fossils of mammals, birds, fishes, plants and molluscs. By studying these fossils and comparing them with bones of extinct species and animals that are alive today, they gradually piece together a picture of life in the Yukon during the Ice Age.

Such a picture includes two different kinds of camels in the Canadian North. One, a very large ancestor of the modern camels, lived north of the Arctic Circle in what is now the Old Crow Basin some 100,000 years ago. Although 30 fossils of teeth, ankle and foot bones from this camel have been found in the ice age sediments along the banks of the Old Crow river, Dr. Harington has not yet been able to positively identify the species. But he does know that the bones are almost twice as big as those of today's camels, making it a very large camel indeed!

Fossils of another better-known species, *Camelops hesternus* or the western camel, have also turned up at a placer-mining site near the Sixty Mile River close to the Yukon-Alaska border. Miners, in the process of washing away layers of frozen silt or "muck" to get at gold-bearing gravels, sometimes come across bones of ice age animals. When they call Museum staff about their finds, further exploration may reveal a treasure trove, such as at one site which yielded fossil bones of woolly mammoth, large-horned bison, horses, American

mastodon, caribou, mountain sheep, tundra muskoxen, moose, wapiti, wolverine, American lion, ground squirrel and goose. All these creatures, according to Dr. Harington, lived about the same time as the western camel.

Although the western camel was evidently quite abundant in the western United States, fossil finds are much less common in the Yukon and Alaska. By reconstructing the animal from bones found in several localities, scientists believe that the western camel looked more like a large one-humped camel, or dromedary, than the modern llama of which it is a relative. By sending a piece of bone from Sixtymile for radio-

carbon dating, Dr. Harington has discovered that the western camel lived in the Yukon about 23,000 years ago — during the coldest part of the last glaciation.

How was the camel able to survive so far north? Evidence from climatic indicators such as tree rings and fossil pollen tells us that the climate of Canada was very different then. While most of Canada was covered by vast sheets of ice, parts of the

Yukon and Alaska remained untouched by the glaciers. There, the climate was cool and dry, and grasses and arctic shrubs were plentiful, making the area a haven for wildlife. Western camels probably migrated to this northern refuge from the south by travelling along a narrow corridor of grasslands on the eastern flank of the Rocky Mountains during a relatively warm period.

They were well-adapted to the arid scrublands and grasslands of the Yukon at that time. And although long nights and some snow were probably typical of winter, Dr. Harington speculates that the western camel was able to withstand the cold arctic nights by growing thick pelts of fur.

But as the climate gradually warmed and the great ice sheets melted, many changes took place that made life in the Yukon impossible for the camel. Ocean levels rose to flood the land bridge that connected North America with Asia. Storms that had previously travelled south of the ice sheets shifted north bringing moister warmer weather to the Yukon. Spruce forests and bog quickly replaced the grasslands. And as their habitat disappeared, the camel and other large grazing animals died out in the Yukon.

By then humans had come to this continent via the land bridge from Asia, and their hunting may have speeded up the camel's extinction. Whatever happened, by about 10,000 years ago, the camel was extinct in North America.

Carol Thiessen
Exhibition Planning and
Design Division



Off the Press



**Handbook of Canadian
Mammals 2: Bats**
C.G. van Zyll de Jong

212 pp., 51 line drawings, 4 pages of
colour illustrations, 20 range maps
ISBN 0-660-10756-2, 240 x 160 mm
\$19.95 (PB)

Édition française:
*Traité des Mammifères du
Canada 2: les chauves-souris*
ISBN 0-660-90277-X

This is not the first time that the Museum has attempted to dispel the many myths about bats: our travelling exhibit entitled *Nightwings* is presently touring Canada, and an entire issue of *BIOME* was devoted to them.

Stan van Zyll de Jong, the Museum's Curator of Mammals, has now shed more light on these small misunderstood creatures in the second volume of the series *Handbook of Canadian Mam-*

mals, dealing with the two families and twenty species of bats recorded from Canada.

This book retains the highly successful format used in the first volume of the series, which dealt with marsupials and insectivores. Its well organized and instructure and clear, concise style make it easy to consult. Each native species is identified by its scientific, English and French names. Descriptions include comprehensive information about weight, measurements, habitats, food, populations, reproduction and behaviour. Bibliographical references are also provided for each species, and the author has included a worldwide perspective on bats.

The book is illustrated with colour plates, black-and-white drawings, and range maps for both Canadian and North American distribution. It also contains an identification key, glossary and bibliography.

This new reference work on bats will be of definite interest to biologists, naturalists, students, and anyone else who would like to learn more about these mysterious creatures of the night.

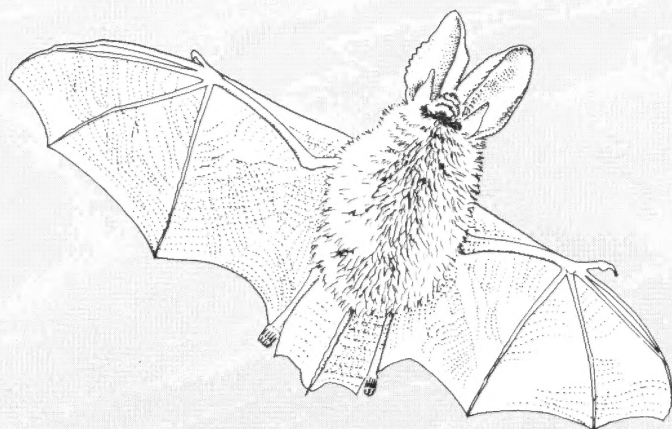
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What else is new?

Do you want to learn about the many uses of gold, the long history of copper and the mixed blessings of uranium? Then call or write to the Museum Information Centre for your free copy of *Minerals, Metals and Man*. This new issue of *Neotoma* written by Joel Grice, Chief of the Mineral Sciences Division, and Ridgeley Williams, Assistant Director of Public Programmes, will make for some truly interesting reading. There is also a colour brochure that we hope you will find enjoyable as well. Its purpose is to describe the Museum in a few words and with a few illustrations. We have prepared it for you...to let you know that the National Museum of Natural Sciences belongs to you!

Louise L. Trahan
Public Services Division



It's (Achoo) Summer (Gesundheit) Again!

It's that time of year once again when many of us face miserable days and nights, often going without sleep, missing work and generally feeling that somehow the joys of summer are not all they're cracked up to be. It's hayfever season!

Your eyes itch, your nose runs, you sneeze and have difficulty breathing. That's when someone comes up to you and says, "Ah, what a beautiful day! Got a cold?"

You are among the millions of people around the world who suffer from pollinosis, seasonal rhinitis, pollen catarrh or, as we most often call it, "hayfever".

stances and they do not elicit an allergic response.

But pollen of many species of plants fulfill all the conditions listed above. Pollen of ragweed and goldenrod are perhaps the best known and most potent causes of hayfever, but many people may be surprised to learn that numerous other plants produce pollens that in some parts of Canada are also major causes of hayfever. Some of these plants are the thistles and sages, as well as poplar, elm, beech, oak, birch and pine trees. The total listing of Canadian plants that are known to be major causes of hayfever includes 40 distinct species!



Oddly enough, hayfever isn't caused by hay, nor is a fever one of its symptoms; but 20% of Canadians suffer to a greater or lesser degree the misery of hayfever.

To your physician, hayfever is an acute allergic inflammation of the mucous membranes within the nose that is sometimes accompanied by asthmatic symptoms. For some people an attack of hayfever may be very serious indeed. Often, patients need immediate medical treatment to alleviate the symptoms.

The causes of hayfever are actually quite well known and have been since the turn of the century. In order for a substance (for this discussion, I will refer to pollen) to cause a respiratory allergy in a human being, certain exacting conditions or prerequisites must first be present. The substance must be foreign to man, that is, it must *not* normally be contained within his chemical makeup. It must be inhaled in relative abundance and must release a chemical antigen (allergen) that is complex enough to attract antibodies.

Certainly, every day we inhale substances that are foreign to our bodies, but they may not produce an allergen or, if they do, the allergen is insignificant and will not attract antibodies to combat it. Thus we are normally unaware of these foreign sub-

There really isn't much the hayfever sufferer can do to alleviate the misery associated with this allergy. Some people have found relief through a series of injections of various allergens administered by their physician. Others stay indoors, often in an air-conditioned environment. Still others have found temporary or permanent relief by moving to a part of the country where the pollen counts, especially that of ragweed, are much lower.

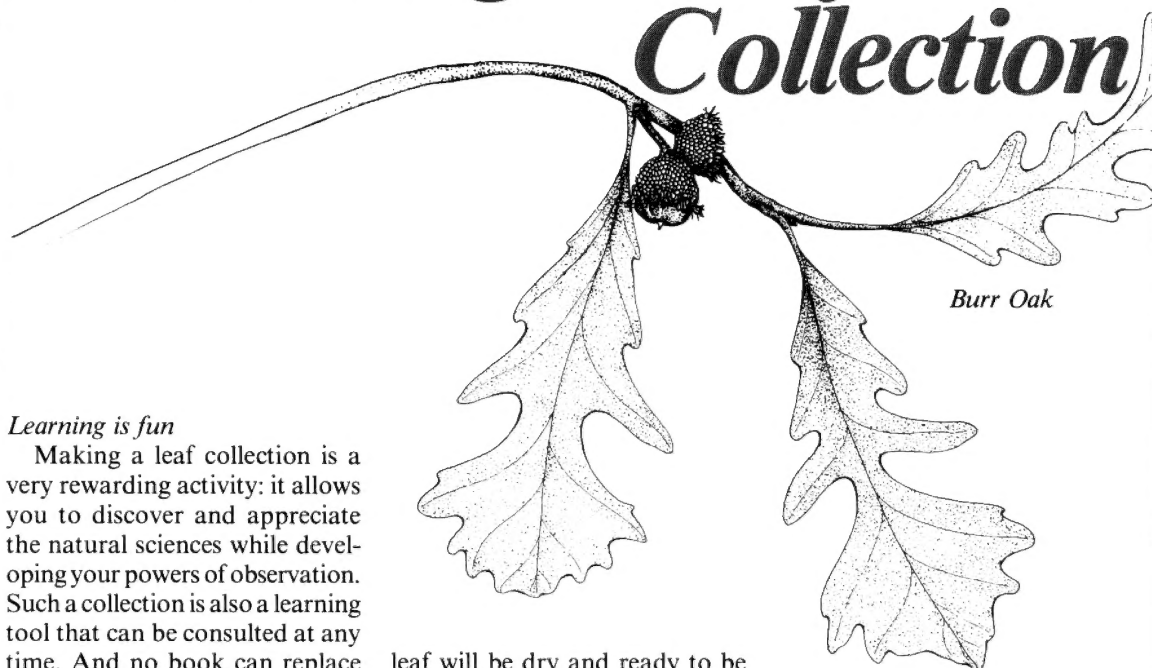
Agriculture Canada has published a booklet entitled *Canadian Havens from Hayfever* (Publication 1570) in which are listed the average ragweed pollen counts for 207 cities and towns across Canada. Through an examination of this list, hayfever sufferers may be able to plan their summer vacations accordingly, thereby alleviating to some degree the discomfort they normally experience.

In very general terms, British Columbia and the Maritime Provinces have much lower counts of ragweed pollen than do Quebec and Ontario. But, regardless of where you live or how you cope with the seasonal discomfort of hayfever, real relief only comes with the first frost. Until then, "here's to your health — gesundheit!"

David M. Jarzen
Paleobiology Division

The Activity Corner:

Making a Leaf Collection



Burr Oak

Learning is fun

Making a leaf collection is a very rewarding activity: it allows you to discover and appreciate the natural sciences while developing your powers of observation. Such a collection is also a learning tool that can be consulted at any time. And no book can replace the personal experience of collecting the leaf from its habitat yourself, thoroughly examining it, and identifying the family, genus and species.

Some advice

There are various easy ways of making a leaf collection in a scrapbook or a loose-leaf notebook, but before we describe them, here are a few recommendations: avoid rare species; obey the laws and rules of parks and reserves as well as regional and provincial regulations; do not trespass on private property; and, when gathering the leaves, be careful not to harm the natural environment.

Methods of preservation

The first method consists of drying the leaf between two sheets of newspaper weighted down with a heavy object. In a few days, the

leaf will be dry and ready to be pasted in your notebook. A second method involves sealing the leaf by dipping it into melted paraffin wax. There is also the pressing method, in which you place the leaf between two sheets of waxed paper, cover it with a cloth, and melt the wax with a hot iron. You then cut off the excess paper, leaving a margin.

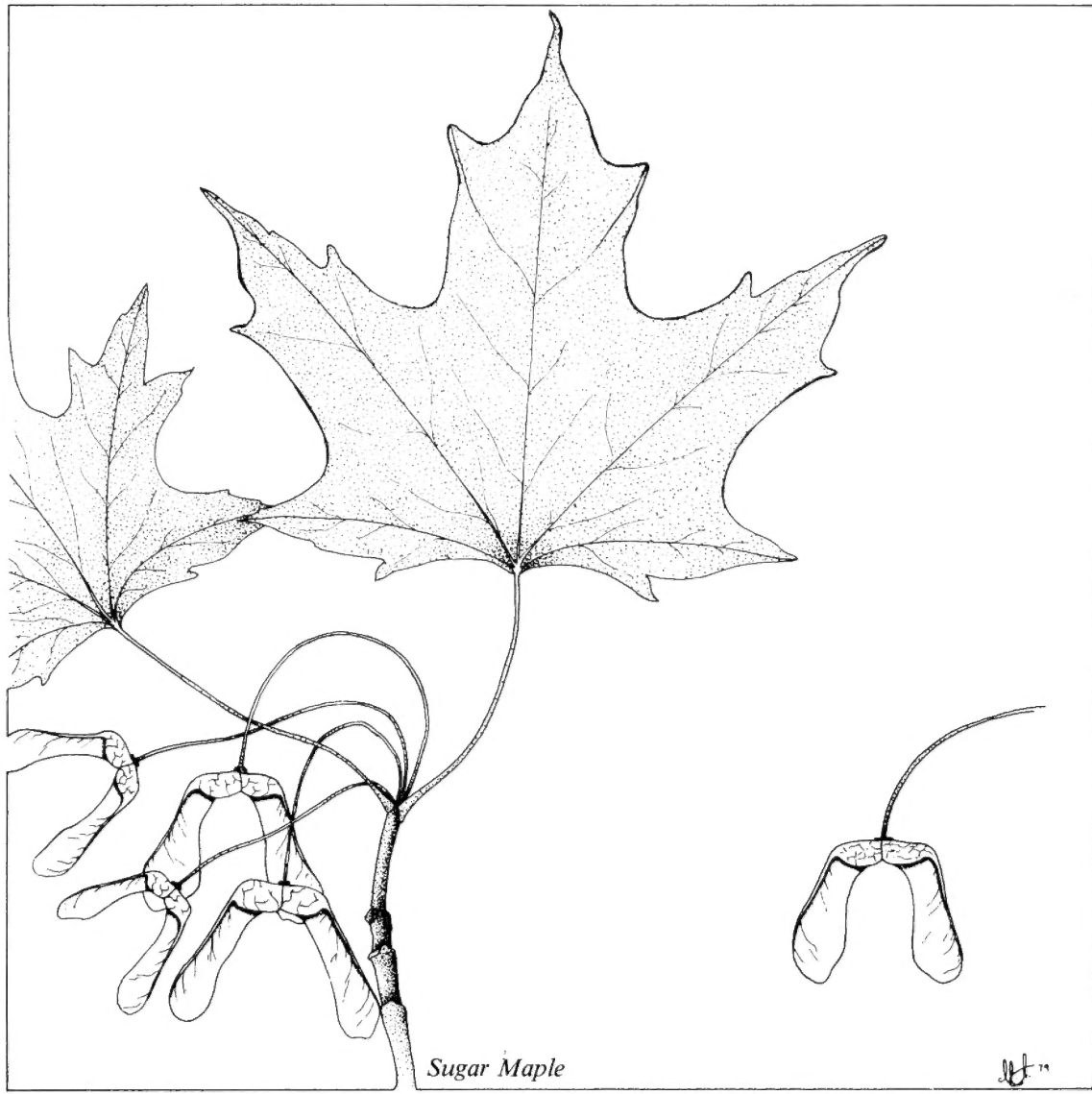
Leaf rubbings are made by placing the leaf on a flat surface, covering it with a piece of paper and rubbing the paper thoroughly with a crayon, pastel or lead pencil to make the veins and outline appear. Finally, there is the staining method, in which you place the leaf on a sheet of paper, and, with a toothbrush or paintbrush dipped in gouache or water colours, stain it to obtain its outline. The advantage of the last two methods is that a single leaf may be used many times by different persons.

However, leaves are not the only objects that can be collected: dried fruit, cones, and moulds or impressions of bark in modelling clay can also be used. Each time that you add a new leaf specimen to your collection, be sure to describe its shape, colour, outline and veins as well as mentioning where you found it, and if possible, the name of the tree from which it was picked.

The pleasure of collecting

Most of us have made a collection at some time in our lives. Whatever you are collecting — pebbles, stamps, cards and so on — you can learn many interesting things from them. A leaf collection is undoubtedly a good, fun way to learn about the magnificent trees around us!

Jean Lauriault
Public Services Division



Sugar Maple